Remarks

Applicants respectfully request reconsideration of the present application. Upon entry of the present amendment, claims 1-12, 48-60, 64-66, 69-75 and 78-84 are pending in the application. No claims have been allowed. Claims 1, 5, 48, 69, 70, 71 and 82 are independent. With the present amendment, claims 1, 5, 48, 69, 70, and 71 have been amended, and claims 81-84 have been added. Independent computing device claim 82 is generally based on independent method claim 48. The application as filed otherwise supports claims 81-84 at, for example, pages 14, 15 and 20-22.

Cited Art

The Action applies the following cited art: Machida, U.S. Patent No. 7,486,734 (Machida); Matsumura et al., U.S. Patent No. 5,835,144 (Matsumura); Shimoda et al., U.S. Patent No. 5,734,783 (Shimoda); Sugimoto et al., U.S. Patent No. 5,650,829 (Sugimoto); Tsukagoshi et al., U.S. Patent Application Publication No. 2002/0106025 (Tsukagoshi); and Puri et al., U.S. Patent No. 5,227,878 (Puri).

Initialed Form 1449 Not Received

On September 10, 2008, Applicants submitted an Information Disclosure Statement listing two pages of references. Applicants have not yet received an initialed 1449 form for this IDS submission. Applicants respectfully request that the Examiner provide the initialed 1449 form for this IDS submission. See MPEP § 609 ("An information disclosure statement filed in accordance with the provisions of 37 CFR 1.97 and 37 CFR 1.98 will be considered by the examiner assigned to the application.").

Response to Rejections of Claims 1-3, 5-6, 11-12, 48, 51-53, 55, 69-71, 74-75 and 78-80 under 35 U.S.C. § 103

In the Office action, the Examiner rejects claims 1-3, 5-6, 11-12, 48, 51-53, 55, 69-71, 74-75 and 78-80 under 35 U.S.C. § 103(a) as being unpatentable over Machida in view of Matsumura. Applicants respectfully disagree.

Claim 1

Amended claim 1 recites (emphasis added):

> *jointly coding the value for the switch code with motion vector information for the set of pixels and with a terminal symbol indicating whether transform coefficient data is encoded for the set of pixels in a bit stream, wherein a single instance of a single variable length code represents a value combination for the value for the switch code, the motion vector information and the terminal symbol, the single instance of the single variable length code being selected from a variable length code table of different value combinations for the switch code, the motion vector information and the terminal symbol*

Regarding the amendment to claim 1, see the Application at, for example, page 24, line 25 to page 25, line 2, and claim 5.

Machida and Matsumura, separately or in combination, do not teach or suggest the above-cited language of claim 1. According to claim 1, an encoder encodes a set of pixels (e.g., for a block, a macroblock). As part of the encoding, the encoder determines a value for a switch code. The value for the switch code indicates whether the set of pixels is intra-coded or inter-coded. The encoder jointly codes the value for the switch code with motion vector information (e.g., for differential motion vector information) for the set of pixels and with a terminal symbol indicating whether transform coefficient data is encoded for the set of pixels in the bit stream. *A single instance of a single variable length code represents the value combination for the value for the switch code, the motion vector information, and the terminal symbol*, where the single instance of the single variable length code is selected from a variable length code table of different value combinations for the switch code, the motion vector information, and the terminal symbol. For example, the variable length code table has different values combinations for <intra, MVx, MVy, last>. *See*, *e.g.*, application at pages 24-25. The encoder outputs the single instance of the single variable length code in the bit stream.

Even though Applicants believe the joint coding claim language before the present amendment was clear, Applicants have amended claim 1 to recite that the joint coding uses "a single instance of a single variable length code" to represent the value combination for "the value for the switch code, the motion vector information and the terminal symbol," to avoid any possible misinterpretation of the claim language.

Machida and Matsumura, separately or in combination, do not teach or suggest joint coding of elements using a single instance of a single variable length code as recited in claim 1.

Machida only describes coding an intra/inter control signal separately from coding of motion vectors A and B. Machida, col. 8, line 67 to col. 9, lines 5. The Examiner acknowledges that Machida does not teach joint coding the switch code, motion vector information, and terminal symbol, as recited by claim 1. Action, page 3.

Furthermore, Matsumura does not teach or suggest jointly coding such elements. The Examiner cites to Matsumura at col. 5, lines 4-6,col. 12, lines 61-67 and col. 13, lines 1-4 as describing a single variable length code that jointly codes syntax elements. Action, page 4. Applicants respectfully disagree. Matsumura describes a variable length code table (Fig. 19) where a given code has a different meaning depending on where the code is used in the bitstream. Matsumura, col. 12, lines 61-67. For example, if the code "110" is used in the block layer, it indicates an end-of-block. However, used in a different location, the "110" code indicates a coded block pattern of "111100". Matsumura, Fig. 19. In other words, *each column of Fig. 19 represents a different meaning for a given code in an alternative context, for a different instance of the given code in the bitstream.* One row of Fig. 19 shows different meanings for a given code in those alternative contexts*, not joint meanings for a single instance of the code.* Thus, for example, a single instance of the "110" code in Matsumura does not indicate both an end of block and a coded block pattern. Rather, a first instance of the "110" code might indicate end of block, while a second instance later in the bitstream indicates a coded block pattern. This point is illustrated in the separate syntax diagrams of Fig. 18.

As discussed above, the cited sections of Matsumura do not describe *joint coding*. At most, Matsumura describes a given code that has a specific meaning depending where it is used, where the specific meaning can change when the given code is used in a different context. For example, Matsumura states at col. 12, line 62 to col. 13, line 4 (emphasis added):

> FIG. 19 shows the variable-length coding table of the third embodiment. A single, self-resynchronizing, variable-length code is used as in the first two embodiments, but most of the codewords now have several meanings. Codeword "110," for example, indicates the end of a block (EOB) **when it appears in the block layer**, but indicates the inter macroblock type (without motion vector data) **when it appears at the beginning of a macrobock header**. It is also used to indicate the "111100" coded block pattern (CBP), and zero motion vector data (MVD). The multiple usage of codewords shortens the average codeword length.

As indicated by Matsumura, the codewords of Matsumura can change their meaning depending on where they are used.

Even if Matsumura describes using multiple instances of a specific codeword to indicate more than one meaning (i.e., a specific individual meaning for each instance), it does not teach or suggest the joint coding of claim 1 that uses "a single instance of a single variable length code" to represent a value combination for "the value for the switch code, the motion vector information and the terminal symbol."

Furthermore, Machida and Matsumura do not teach or suggest jointly coding a "terminal symbol indicating whether transform coefficient data is encoded for the set of pixels in a bit stream," as recited by claim 1. Regarding the terminal symbol language, the Examiner cites to Matsumura at col. 12, lines 61-67 and col. 13, lines 22-28. Action, page 3 and page 5 (with regard to claim 48). Applicants respectfully disagree. As described by Matsumura, none of the codes listed in Fig. 19 represent a "terminal symbol indicating whether transform coefficient data is encoded for the set of pixels in a bit stream," as recited by claim 1. Specifically, the end of block (EOB) element indicates an end of coefficients *after some coefficients have been received from the bit stream* (see diagram 29 in Fig. 18). The end of macroblock (EOMB) element is used to partition macroblocks so that macroblock addresses do not have to be coded. Matsumura, col. 12, lines 38-46.

Elsewhere in the Office action, the Examiner cites to Puri's description of a block classification signal (col. 12, lines 60-67) as describing the terminal symbol language. Action, page 13, with regard to claim 54. Applicants respectfully disagree. The block classification signal of Puri appears to indicate whether inter or intra coding is used. Puri, col. 12, line 60 – col. 13, line 34. It does not indicate a "terminal symbol indicating whether transform coefficient data is encoded for the set of pixels in a bit stream," as recited by claim 1. In any case, even if one of the cited references were to describe the claimed "terminal symbol" as a separate syntax element (a conclusion with which Applicants do not agree), the cited references still do not teach or suggest joint coding of the elements recited in claim 1 using a single instance of a single variable length code, as recited in claim 1.

Applicants recognized and exploited the dependence in certain coding scenarios between the specific syntax elements claimed (e.g., switch code, motion vector information, and terminal symbol) using a single custom variable-length code for jointly coding/decoding the elements. *See*, *e.g.*, application at pages 24-25. Use of a single instance of a single variable-length code exploits the dependence or correlation between the recited elements (the switch code, motion

vector information, and terminal symbol) to more efficiently code the values as a single variable length code. This represents a novel and non-obvious improvement over the prior art.

For at least the reasons discussed above Machida, Matsumura, and Puri, separately or in combination, do not teach or suggest the above-cited language of claim 1. Therefore claim 1 should be in condition for allowance.

Claims 5 and 70

Amended claim 5 recites:

> jointly coding the value for the switch code with motion vector information for the set of pixels and with a terminal symbol indicating whether transform coefficient data is encoded for the set of pixels, wherein the jointly coding yields an extended motion vector code that is a single instance of a single variable length code representing a value combination for (a) the value for the switch code, (b) the motion vector information and (c) the terminal symbol, the single instance of the single variable length code being selected from a variable length code table of different value combinations for the switch code, the motion vector information and the terminal symbol, wherein the terminal symbol indicates whether subsequent data for the set of pixels is to be output.

Amended claim 70 recites:

> means for encoding an extended motion vector code for a set of pixels, wherein the extended motion vector code reflects joint encoding of motion information together with intra/inter decision information indicating whether the set of pixels is intra-coded or inter-coded and with a terminal symbol, wherein the terminal symbol indicates whether subsequent data for the set of pixels is included in a bit stream, and wherein the extended motion vector code is a single instance of a single variable length code representing a combination of values for (a) the intra/inter decision information, (b) the motion information and (c) the terminal symbol, the single instance of the single variable length code being selected from a variable length code table of different value combinations for the intra/inter decision information, the motion information and the terminal symbol.

Claims 5 and 70 have been amended similarly to claim 1 above. For at least the reasons discussed above with regard to the above-cited language of claim 1, Machida, Matsumura, and Puri, separately or in combination, do not teach or suggest the above-cited language of claims 5 and 70, respectively. Therefore claims 5 and 70 should be in condition for allowance.

Claims 48, 69, and 71

Amended claim 48 recites:

decoding an extended motion vector code for the set of pixels, wherein the extended motion vector code reflects joint encoding of motion information together with intra/inter decision information indicating whether the set of pixels is intra-coded or inter-coded and with a terminal symbol, wherein the extended motion vector code is a single instance of a single variable length code representing a combination of values for (a) the intra/inter decision information, (b) the motion information and (c) the terminal symbol, and wherein the decoding the extended motion vector code uses a variable length code table of different value combinations for the intra/inter decision information, the motion information and the terminal symbol; and

determining whether transform coefficient data for the set of pixels is included in the bit stream based at least in part upon the terminal symbol.

Amended claim 69 recites:

means for decoding an extended motion vector code for a set of pixels, wherein the extended motion vector code reflects joint encoding of motion information together with intra/inter decision information indicating whether the set of pixels is intra-coded or inter-coded and with a terminal symbol, wherein the extended motion vector code is a single instance of a single variable length code representing a combination of values for (a) the intra/inter decision information, (b) the motion information and (c) the terminal symbol, and wherein the decoding the extended motion vector code uses a variable length code table of different value combinations for the intra/inter decision information, the motion information and the terminal symbol; and

means for determining whether subsequent data for the set of pixels is included in the bit stream based at least in part upon the terminal symbol.

Amended claim 71 recites:

decoding an extended motion vector code for the macroblock, wherein the extended motion vector code reflects joint encoding of motion vector information together with intra/inter decision information indicating whether the macroblock is intra-coded or inter-coded and with a terminal symbol, wherein the extended motion vector code is a single instance of a single variable length code representing a combination of values for (a) the intra/inter decision information, (b) the motion vector information and (c) the terminal symbol, and wherein the decoding the extended motion vector code uses a variable length code table of different value combinations for the intra/inter decision information, the motion vector information and the terminal symbol;

determining whether subsequent transform coefficient data for the macroblock is included in the bit stream based at least in part upon the terminal symbol; and

if the terminal symbol indicates subsequent transform coefficient data for the macroblock is included in the bit stream, decoding a coded block pattern code for the macroblock, and otherwise skipping the decoding of the coded block pattern code for the macroblock, wherein the terminal symbol indicates whether

the coded block pattern code for the macroblock is included in the bit stream..

Claims 48, 69, and 71 have been amended similarly to claim 1 above. For at least the reasons discussed above with regard to the above-cited language of claims 1, 5, and 70, Machida, Matsumura, and Puri, separately or in combination, do not teach or suggest the above-cited language of claims 48, 69, and 71, respectively. Therefore claims 48, 69, and 71 should be in condition for allowance.

Furthermore, regarding claim 48 (Action, page 5), the Examiner cites to columns and lines of a Machida that are not present in Machida (e.g., col. 12, lines 60-67 and col. 15). It appears that these cites are from the prior rejection using the Puri patent (see Dec. 12, 2008, Office action).

Claims 2, 3, 6, 11, 12, 51-53, 55, 74-75 and 78-80

Each of dependent claims 2, 3, 6, 11, 12, 51-53, 55, 74-75 and 78-80 depends directly or indirectly on one of claims 1, 5, 48 and 71 and, therefore, should also be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Response to Rejections of Claims 4, 50, and 73 under 35 U.S.C. § 103

Claims 4, 50, and 73 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Machida in view of Matsumura in further view of Shimoda. Claim 4 depends on claim 1, claim 50 depends on claim 48, and claim 73 depends on claim 71. Machida, Matsumura, and Puri, taken separately or in combination, fail to teach or suggest the above-cited language of claims 1, 48, and 71, respectively. Shimoda fails to remedy this deficiency of the rejections. Although Shimoda describes variable length coding and decoding as part of video coding/decoding system, it does not address variable length coding and decoding of motion vector information or other motion information, and it is even further from teaching or suggesting the joint coding or corresponding decoding recited in claims 1, 48, and 71, respectively. For at least this reason, claims 4, 50, and 73 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Response to Rejections of Claim 9 under 35 U.S.C. § 103

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Machida in view

of Matsumura in further view of Sugimoto. Claim 9 depends on claim 1. Claim 9 depends on claim 1. Machida, Matsumura, and Puri, taken separately or in combination, fail to teach or suggest the above-cited language of claim 1. Sugimoto fails to remedy this deficiency of the rejection. Although Sugimoto describes motion vector detection and compression, with an emphasis on different ways of performing motion vector detection, it does not detail coding and decoding of motion vector information or other motion information, and it is even further from teaching or suggesting the joint coding language recited in claim 1. For at least this reason, claim 9 should be allowable. The Applicants will not belabor the merits of the separate patentability of this dependent claim.

Response to Rejections of Claims 49 and 72 under 35 U.S.C. § 103

Claims 49 and 72 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Machida in view of Matsumura in further view of Tsukagoshi. Claim 49 depends on claim 48, and claim 72 depends on claim 71. Machida, Matsumura, and Puri, taken separately or in combination, fail to teach or suggest the above-cited language of claims 48 and 71, respectively. Tsukagoshi fails to remedy this deficiency of the rejections. Although Tsukagoshi describes aspects of a video decoding system, it does not address variable length coding and decoding of motion vector information or other motion information, and it is even further from teaching or suggesting decoding of a code that reflects joint encoding as recited in claims 48 and 71, respectively. For at least this reason, claims 49 and 72 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Response to Rejections of Claims 65 and 66 under 35 U.S.C. § 103

Claims 65 and 66 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Machida in view of Matsumura in further view of Official Notice. As a threshold matter, the Applicants respectfully disagree with the Examiner's use of Official Notice in the rejections. In any case, each of claims 65 and 66 depends on claim 48. As discussed above, Machida, Matsumura, and Puri, separately or in combination, fail to teach or suggest the above-cited language of claim 48. The features that the Examiner cites as being well-known in the art do not relate to variable length coding and decoding of motion information, and they are even further from teaching or suggesting decoding of a code that reflects joint encoding as recited in claim

48. For at least this reason, claims 65 and 66 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Response to Rejections of Claims 7-8, 10, 54, 56-60 and 64 under 35 U.S.C. § 103

Claims 7-8, 10, 54, 56-60, and 64 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Machida in view of Matsumura in further view of Puri. Claims 7, 8, and 10 depend on claim 5, and claims 54, 56-60, and 64 depend on claim 48. Machida, Matsumura, and Puri, taken separately or in combination, fail to teach or suggest the above-cited language of claims 5 and 48, respectively. Generally, the Puri patent describes (a) a block classification signal that includes an inter/intra coding type signal, (b) differential motion vector components and (c) a one-bit macroblock_code_nocode flag, but these elements are separately sent to an encoder and multiplexer for transmission as different syntax elements in an output bit stream. In addition, Puri does not teach or suggest the claimed "terminal symbol." For at least this reason, claims 7, 8, 10, 54, 56-60, and 64 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims

Interview Request

If the claims are not found by the Examiner to be allowable, the Examiner is requested to call the undersigned attorney to set up an interview to discuss this application.

Conclusion

The claims should be allowable. Such action is respectfully requested.

Respectfully submitted,

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